10/26/00

- Imaging / Cataloging
- Tray movement
- Reference back to Samples of interest

- sort for crystal only images

- storing images over time to compare images at Δts

6 times
1st week
1 ea/wk for 12
after

- using to image as a filter

- 3 different temperature
4°, 12°, 20° C

> 10 μ xtal

ideal 100 μ xtal

- Learning system

- zoom variable to more closely analyze
regions of interest

Companies
- JMAR
- OGB

Scripps - off-shoot / Cyrex - competitor

Cyberlab.com?

- Gentle moves - not disturb drops in suspension

11/1/00 - Meet w/ DVT
- Resolution
- Low level algorithm access
- Open relationship for critique & improvement
- Documentation complete
- Group editing capabilities
- Complete remote access to thresholds
- Group thresholds

11/2/00 - SGC

- Store images in automated fashion
  - sort / categorize

- Sinkatron / X-Ray Generator
  20-30 μ xtal size - ideal

- Diffraction patterns generated from X-ray

- Single Plate ≈ 15 mins to manually analyze

- auto elimination of clear drops w/ no xtals

- Lighting & image quality not comparable to microscope

- Speed of jog through plate

- resolution of image
- Largest FOV — complete drop
- Smallest w/ microscope FOV ≈ 1/4 of drop

- VideoCMM II V1.05 J-MAR
- Measurement of xtal size

- drop size ≈ 2-4 mm dia
- light microscope / back light only

- Thumbnail images of each well
  maybe more   3-5 images per
- Thumbnails of all images per well

- live image update   like video

10 prot./wk   or   30 plates/~~day~~ wk
  3 plates/prot. 1 for each temp. 20, 12, 4 °C

5000 proteins /5year → 3/day solved

Panasonic GP-F602 camera

NIKON 50 WAD - light source?
  - apertures 628747

Fiber optic

Nikon 10x 16E 1
       3x   230 6

J·MAR Model: MST XY 0410 FD40
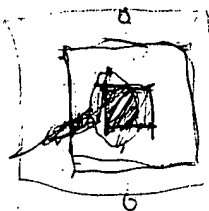
Microscope

Olympus - (SZ×12)
          SZX-LD100

Pixera camera PVC100C

Diffuse FO backlight

11/8/00 = <u>Inspector Testing</u> w/ ERIN
- Find Error included in Average & Min ?

- gives valid pad coverage
- gives spot size find error
  because blob not in ROI

- disable or hide inspection settings at
  operator level.

<u>Meeting</u>
<u>11/12/00 PURAS1P - new customer</u>

- Get Marconi Boards & Test results
- Schematic enough to order connectors
  & layout on box on Curbie
- SG* - sit down w/ Andy
    - camera lighting system
    - quote machine
    - software definition
- VSC -
    - how they hold slides
    - fix Galil problems
    - contact - set up time
- Update Website
- Call Fotolachy today

11/13/00 LSGX

- 2-4 mm drop size
- 4°C operation
- No heat generation by light / IR filter
- as small as <u>1 Micron</u> in size
- ideal xtal 100 μ^2
- 1.5 mm depth-of-field
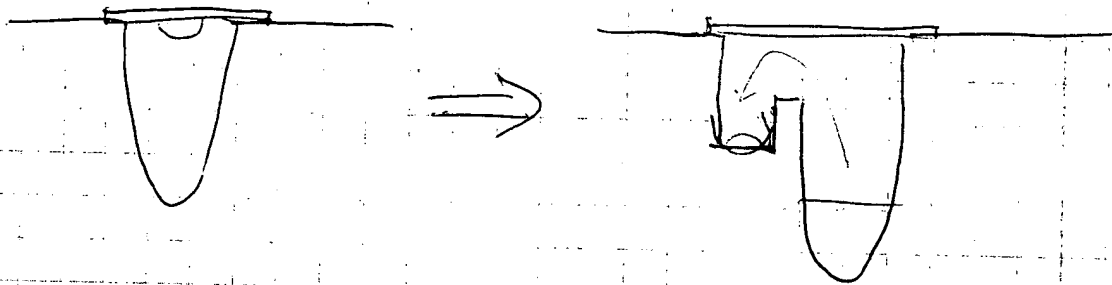
- Bottom light source
- light source config vs x/y movement
- 5, 10, other plates on machine?

11/22/00 — SGX

LENS SELECTION — DESIGN NOTES:

FOV: 4 mm
Camera Res. 1024^2

$$4/1024 \approx 4\mu/pixel$$

Ideal xtal $\approx$ 100 μ^2
    for 10x accuracy
∴ Min. camera Res ≯ 10 μ/pixel

For High zoom/res:

xtal as small as 1 μ^2
    for 10x accuracy
∴ camera res → 100 nm^2 or .1 μ^2
    @ 1024: FOV would be .1024 mm^2

<u>11/27/00</u> - Meeting

- Sequenom - Del coming tomorrow 9 am
- Type up new QC Checklist items
- X-mas party Dec 15 - Fri Eve
- 1/0 map updated on cubie - update program
- Weekly reports - bring to meeting
  summary of last week
  plan for upcoming week

- Get software from David for Inspector
- Get boards from UCI
- Get Demo Hardware for SGX

12/28/00 SGX

w/ VZM-300J lens

ⓐ .75x   Res ≈ 4.7 μ/pixel

@ 3x   ≈ 1.14 μ/pixel

used spacing of wells on MTP to calc

FOV ≈ 1.5 mm x 1.17 mm   .5 mm DOF ≈

For ideal .1 μ/pixel

FOV ≈ .13 x .1 mm

                                              current ≈
                                              115 mm ?
Edmund $895   35mm WD DOF?
→ VZM 1000 → .88 mm FOV
Infinitube 100x → .109 mm FOV $1490   DOF≈ .6$\mu$ 6mmWD

Navitar
Ultra Zoom 10x → 1.2 - .18 FOV   20mm WD DOF?
    1-60228 + 1x, M

1/2/01 - Meeting

→ Andy Sturman - Get new firmware
→ Test latest inspector SW
✓ → Install arranger upgrade
→ SGX proposal
→ Marconi Status Report
    - Deliver components to UCI - Order connectors
    - Get all other parts
→ ESI application

1/4/00 - SGX - Project proposal

- 25-26 January - Automation Partnership to visit

- Multi image viewer

- Bar codes
  - plates - kryogen?   - Tube labeling
            - TAP
            - Robodesign

1/5/00 - ESI

- Variations around 360°
- Continuous Start/Stop & Data collection

- Automated acceptance - data collection
     through-out 360°
✗ - verify settling - in program
✗ - tuning support

~~Vision Design~~

1/11/00 — SGX (Kick-off)

183 — MACH 1

184 — MACH 2

185 — ENGINEERING

$\downarrow$
183 — 184 — 185

- Determine Camera configuration
  - Board, Camera, Lens(es), Light
  - Dimensions, WD (range), Motorize Zoom?
  - Analog output to Light-source
- Order Parts Next week 1/15/00
- VRE — check option
- Test Camera/ Hi-zoom on Inspector
- Calibration Target
- Room Humidity — Temp?/ Fog lens?
- Robo Soft / RoboVision Patent
  - call Johnny Ross

1/11/01 — Inspector

Spot Display — recenter or shrink so
spot below / doesn't snow.

1/23/01 - SGX

- Experiment w/ 1K x 1K camera on Inspector Platform

- ~ Resolution of camera .57 μ/pixel

- observed excellent stability when stationary

- motor res. 2.5 μ/enc cnt.

- pressure on baseplate
  introduced ~ 10 pixels of deflection
  or ~ 5 μ

- with pressure on the stage
  introduced ~ 40 pixels of deflection
  or ~ 20 μ

1/24/01 - Inspector Install   (87.3 HRS)

- Adjusted inspect positions after move of machine

- Matrix not always running after selection of matrix after pad

- Rebuild not triggering after update of taught position

- OperDef table dump not working @ programmer level.

1/25/01 - SaX & TAP
- 12 plates / 3½ - 8 minutes
- moves 1 m/s accel .5 m/s²
- check camera orientation

- valve for heating xtals
- 2/6/01 - meet w/ Bead Microsource
- John C. meeting for software & DB

1/29/01
- SM command
  AB MO SM - look for 10V @ Drive Cmd
  not there immediately
- Send new firmware w/ debug term enabled

2/1/01 - SCS - control kickoff 1186?

3 phases
  - concept
  - detail
  - build & debug

Control block diagram / concept.

- Distributed Galil
- PLC & Galil
- Think & Do & Galil
- VB & Galil

2/12/01 CCD - Detector Research

Rigaku   * ADSC
Thomson-ISF
* Mar
Bruker?
Nonius
* Jupiter

Meeting w/ SGX 2/12/01

- Must discuss computer location / cabling etc
  start/stop controls, etc.

X-RAY discussion

- bede microsource
- mirror options
- detector as close as possible < 300 mm

- diffracted beams - through solution or plate?

- reference x-tal after plate
- 40 μ for CCD resolution more important than overall size

- Mike Blum build Mar CCD

2/14/01 - Robo Vision Development

$\boxed{\text{Zoom optical}}$

camera pixel size / pixel resolution = zoom optical

i.e. CV-M1 JAI camera

$\dfrac{6.7 \mu}{.67 \mu / pixel}$ pixel size = $\boxed{10 \times \text{zoom}}$

~~Pixel size cam~~

$\dfrac{\text{pixel size monitor}}{\text{pixel size cam}}$ = $\boxed{\text{magnification}}$

pixel size mon. $\dfrac{\text{monitor size}}{\text{monitor res.}}$

$\dfrac{(17" - 1")/1.2}{1024}$ = $\dfrac{.0125"}{pixel}$ or $\dfrac{317.5 \mu}{pixel}$

$\dfrac{317.5 \mu/px}{6.7 \mu/px}$ = 7.388 M $\times \dfrac{10x}{zoom}$ = $\boxed{473.9 \text{ M}}$

$\boxed{\text{Image scaling}}$

$\dfrac{\text{Twips}}{15}$ = Window size in px

$\dfrac{\text{Window size in p.}}{\text{mon res.}}$ = scaling

17960/15 → $\dfrac{11 \, 7}{12 \, 0}$ = $\boxed{.9354x}$ $\times$ 473.9 = 443.3

key variables

camera px size
Monitor size
monitor res ?

3/16/09 - SGX

T_0 - image after loading ⎫
⎪
~~24 hrs~~ ⎬ 4x
T_1 - 1 day ⎪
T_2 - 3 days ⎭
T_3 - 7 days
T_4... - 1/wk out to 13 wks.

every well every time
@ drop view
unless dried up

40% of plates have @ least 1 crystal

Crystals ma need further zoom

- Non-crystal images — delete

40 proteins/ wk → goal for stability

2 plates p protein

≈ 100 plates per wk - after optimization studies, etc
   BTU estimates

- UPS system for data integrity on Gantry

Weekly
3/26/01 - Meeting

- get new firmware from Galil

- Goal - SGX - ship Friday
- make list of questions
- description of functions for SGX

- SGX to come ≈ Thur to review machine functionality

Questions for SGX   3/26/01
- plate types intended for initial run.
- image delete features
- image load features
- image save options in manual explore mode.
- invalid Barcode - enter manually?
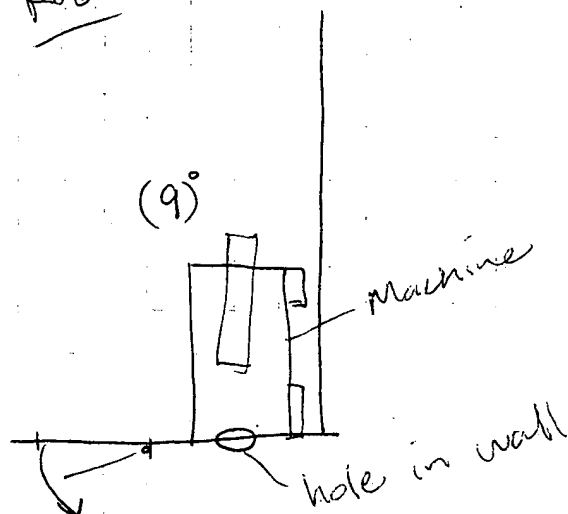- Drop size?

SGX needs.
- bar code/type plate

Database Notes
- data indicating z-height adjustments
  light

3/29/01 - SGX

- thumbnail view order confusing
- highlight location in tray associated to thumbnail
- updates of display for matching location
- status display updating during run
- Paused live - images still dumping to thumbnail
- measure display in Microns
- plate select updates thumbnails
- select saved images after a manual exploration

- visit to go through variations of drops
- dark field illumination from back
  - Janet has sample light

- focus issue worse in a sitting drop

- new name? for machine

- Drop Find - key function
- Thumbnail shows drop if found

Room

$(9°)$

machine

hole in wall

Processing

- focus @ bottom of well to check for crystaline in salt type
- typical drop size - 3-5 mm ≈
- inspect for jolted trays
- size of crystal
- shape
    - 7 - grainy precipitate, possibly crystaline $< 10\mu$
    - 8 - sparkles, resolve xtals $< 10\mu$
    - 9 - $> 10\mu$
- size, volume estimation
- guess at morphology - shape
- temperature
- sort by chemistry make up
- intergrown crystals

now { 96 well } hanging drop / definite
     { 48 well }
                              96 sitting drop
       24 } possible   1-2 mos
       1536 }

- Array Definition needs to accomodate
  multiple props per well

- invalid barcode
  - ability to run anyway
  - possibly enter ID
  - not automatically store images
  - eventually dumped if not handled manually

- 10 alpha numeric
- first character identifies tray

4/2/01 - Staff Meeting

- AMGEN - Brian wants to visit. get pharmecutical bus.
- SW engineer - give a test, interview Wed. ?
              actually sit at some code.
- meet w/ BioDiscovery on Thursday. - colaboration
      Thurs. - Santa Monica 10 ⌐
- meeting report - from SGX meeting
      - write PhaseII quote.
- need more communication as to SW status. - Brian
      not understanding, why sw can't be released.
- Tax Audit on Friday
- Book SGX storage system this week ?
- Warentee needed for Robo Arrayer. - Must be 1 yr Limited
- Machine on floor - SGX - needs SW install

4/2/01 - Marconi

- Change to add AC offset works
* change range to 0-7
* part availability for AM27C512
* no less than 20 ms poll value / maybe 40 ms

4/3/01 - SGX SW testing

- drop position not applied properly to
  correct for drop position
- drop images not displayed during run as
  thumbnail
- 579.3 , 488 → 577.35 , 147.28   C1 → C2
  6.49 , 44.0   215.665   68.38 △

- Version # on Insp. UI
- Homing after EMO not working
- image update of control app not
  always displaying on snap

- predefined bar code ID for calib

4/4/01 - SGX SW Testing

- Pub directory for images
- DB Mon   install Dir
- Current   re . # DB, & txt

4/4/01 - Marconi - Conf. Call
- Find PADs File, with additional layout
- Clock Freq. running 186 @   changes.

4/5/01   - SGX SW

- pixel Res. set as by Ref on Zoom level

1.55 - closing SW - turn light off?
2.199 - Build 18 no skipping plates
          absent
- find drop not fun t. / input cur ray offset
                                    param
- focus offset - persist

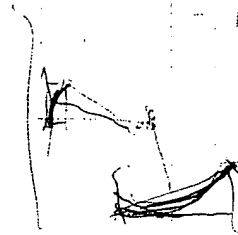- if not valid drop position, return false
- improve filtering of drop selection

4/9/01   - SGX SW   focus

Load plates   Ctl - right clear
Home   Sht - left click
Select plate Type   adjust offset for
                               next index
                               Ctrl left adjust & jog
                               offset

4/9/01 - SGX SW

A1	-1032	670
A2	-955	278
A3	-131	690
A4	0	0
A5	245	667
A6	151	637
A7	-419	194
A8	255	372
A9	302	881
A10	302	643
A11	235	1176
A12	700	1444
B1	-191	844
B2	0	0

$$569.448 - .420 = 1.032$$
$$567.996$$

$$569.448 + .420 = 569.860$$
$$1.032$$
$$568.828$$

$$570.892$$
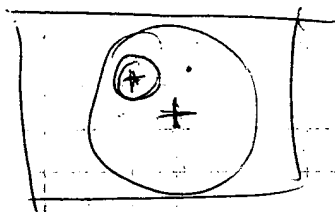
- Image Save option during manual exploration
- persist plate type
- persist focus offset

$$512 - 501 = 11$$
$$648 - 440 = 208 \times 6.7 =$$

4/10/01 — SGX SW Testing

— Run Inspect button on Cam Set page not wired

4/10/01 — SGX @ ⟨109.8⟩ Installation #32

— ~~Focus~~
— ~~Zoom~~ adjustment — easier & automated
— interlock
— intuative controls for manual exploration
— Save Button & Print button
— Automated live
— ESTOP recovery
— Error "Op Grab"
      failed grab operation — related to motor
      error
— Estop recovery related most likely

4/10/01 SQNM — Ebin

— Not swing ~~straight~~ position
— Run 2x after initial load of Matrix
— 384 chips mostly
— Incoming QC
— DVT timeout errors.
      ↳ more frequent when ~~its~~ power save on
         laptop triggers.
— Application already running
— Inspection results not display on front screen
— header each printed page...?
— pos error on z-axis ⟩ retry not always
— DVT timeout errors ⟩ working
— Data on Reports "non-sensical"
      ↳ Add count for find errors
      ↳ need other examples.
— Inspection Time seems high
   — Motor Driver?
   — DB access?
   — Motor Tuning?
   — DVT event handling?

4/11/01 Marconi

- Gene & Ted   continue testing
- Meetings Continue on Wed
- Oscillator exact frequency -
- 0-15 range on 'r' command.

- Defaults - for GN PL, ZR
     verify that we power up with same defaults
- CP command not maintaining through Power up

4/11/01 - SNM - Matrix Inspector (109.7?)

- New SMIF not compatible - "Failed to Open Motor IF"

- 384 taught vs build offset on inspect pos

- intensity reference move to not overlay pads

4/11/01 - SGX

* E-stop during move - didn't recover
→ Setting for second pass zoom level
→ ability to rerun plate w/o having to find the
     drop again.
→

4/12/01 SGX — Database Discussion

- Inspection Workable Database
- Mirror of Server vs Robovision
- Query builder tool
- Offline viewer

- Inspection List builder
- Results Xfr
- Maintenance Utilities
- DB Editing Utility

4/16/01 — Weekly Meeting

- Get Final Revision of software, out
- SGX roadmap — meeting Tues "what's next"
- Assist in Opto 22 update w/ David
- Pin Inspection
- Marconi need clock frequency of 186

4/16/01 — Staff Meeting

- Call Sequenom in Germany about visits
- Patent Application on Robovision
- Review points for Sequenom issues
- Forward Email to Brian on Volume Insp f/ Wilbur

4/16/01 - Depth of Field SGX

$2.5x \approx 250\mu$ $\qquad 1x \approx 1000\mu$
$4x \approx 150\mu$
$5.5x \approx 110\mu$
$7x \approx 80\mu$
$8.5x \approx 60\mu$
$10x \approx 50\mu$

★ Sorting of images by well # in
   thumbnail vs well not correct

4/18/01 - BHU PATENTS, JOHN ROSS

- Robosoft - need examples of implementation
      - block diagrams
      - show robosoft vs old, other methods
      - nomenclature for our method

4/19/01 - SGX   (113.5 Hrs)

- E-stop Recovery - position error?
- 48 well drops on edge not found
- scoring system
- right-click on thumbnail to goto
- keypad manipulation of manual exploration
- add images manually taken to thumbnail view
- manual correction of drop find

- 2nd monitor attached
- improved focus algorithms
- drop height 2mm or less
- slices may be preferred
- focus scans during find drop also worth inv.
- Disk storage utility
- Remove File Exit from Config
- Pause live while measure
- if possible remove cross hairs on Magnify Glass
- manual exploration restore zoom & light to run
    settings
- 1536 integration low priority but to be able to at
    least image/approach?

4/23/01 - Weekly Meeting

M [- Final software out this week for Marconi
  [- Quote out Today for PH II RoboVision
SGx[- Meet w/ David to Discuss next release
  [- Test David's current release candidate
  [- Improve focus methods

4/25/01 - Marconi

- Firmware go ahead, if closer to a week
- Double check clock circuit

4/26/01 - RoboVision Install SW   RLS SN 31

- Install RoboVision
-     "   MV Tools w/ LaTeX
- make sure "small fonts" under video card,
     settings, advanced
- upgraded SNAP 10.0cx to 3/6/01 version
- increase paging file

4/30/01 SGX - SW testing

V. 25
- clear home indicator once EMO pressed
- well selection doesn't follow thumbnail selection
- live & auto focus flashes
- when right-clicking well to go to, thumbnail
  doesn't get re painted (or hidden) when moving
  the mouse off that well selection
- plate, well status bar
- File 'Close on Config screen causes Run not
  to work anymore

- Off line processing or || processing of Find Drop?
- Run doesn't stop @ end.
  - shows "reading bar code"
    (manual ID plate 1) when happened
- new I/O driver installed, doesn't restart after
  disconnect

- manual ID, plate did not run second pass
  after find drop
  & left second plate (which was disabled) selected
- right click on thumbnail for goto, not working
- left right, up down navigation through
  thumbnails is off
      up → right   right → down) correlates to
      down → left   left → up) plate position
                                not thumbnail?
- When using Ctrl- "failed to find H6 well record"
- image display did not show selected image
  - not sure how it got in this state.
  - press Run (Begin) then stop after a few wells
    then it worked again
- focus, remove overlay on focus image

5/1/01 - SGX SW Testing

- When new run, new plate enabled, old plate not deselected (re-painted)

- Well status after a manual correction how is it updated?
- after manual correction, thumbnail updated, but large image still shows well view, if run stopped mid plate
- next/prev option with Auto-Focus?

- after manual exploration, goto an new well, zoom restored, light level not
- well image display (small) appears grainy b/f image grab.
- ctrl- jog moves selected image unless you select outside of thumbnail view first
- thumbnail @ plate view not always hiding after right-click goto
- DMV status colors correct?
- 96 well 48 well selection N/A/hide/remove
- 48 well highlight not correct size
- live after double-click goto

5/2/01
- Pause - Red button should flash?

123

5/1/01 - Pyxis ~ Cubie   meet w/ Eric

- Cubie has wedge to hold ~~cube~~
  down cubie, so contacts ~~don~~ stay connected
- Start, Stop light bulbs
- Rotary on conveu or so it doesn't fail
- End of tour, contact → while Eric out
  the next 2 wks
- Andy ~~cab~~, new firmware for board

5/1/01 SGX Demo

- During Run, all die eys off well update
- Cheat sheet with ~~stall~~
- Referenced memory @ could not read

- Database system + tour i/ Cindy, Jason
- 1536 plate, robot in mask for plate
  set up
- relate ROI $ who else in DB

5/3/01 - RoboArrayer

LENS SELECTION
EDMUNE
VZM-B00L FOV min.
on 2/3 format JAI   1300 × 1000

$\frac{9.7 \, \mu/pix}{12.2 \, mm} \rightarrow 2.3 \, \mu/pix \rightarrow 2.19 \, mm$ for 2/3 format

or

$\frac{9.9 \, \mu/pix}{4088.4 \mu/pixel}$ ... 6.4 μ pixel JAI
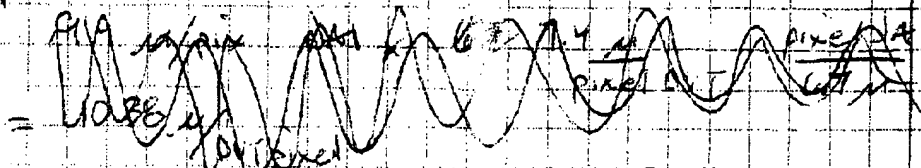
8.8 mm CCD width 2/3"
4.8 "   1/3"

or $\frac{4.8}{8.8} = .545 \times 12.2 \, mm = 6.65 \, mm \times$ DVT
                          $\times$ $= 4.99 \, mm \times$ FOV max

or min = 1.68 mm $\times$

NZM-300i

max 6.45 mm / 640 pixels = 10.39 μ/pix.

min 1.63 mm / 640 pixels = 2.54 μ/pix

or

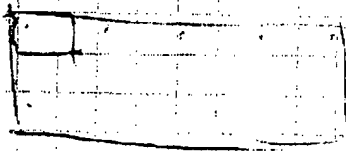NZM-200i

max @ $\frac{1}{2}''$ format $\rightarrow$ $\frac{1}{3}''$ format

12.0 mm $\times \dfrac{4.8}{6.4}$ = 9 mm $\times$ 6.75 mm

min @ $\frac{1}{2}''$ format $\rightarrow$ $\frac{1}{3}''$ format

3 mm $\times$ .75 = 2.25 mm $\times$ 1.69 mm

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5/10/01 - SGX   v 1.1   SW install   (122.2)

Old SW

	Zoom	X Pos	Y POS	Z POS	Max Light
1	0	60.646	119.683	79.903	948
2.5	146.97	60.455	188.693	77.383	741
4.0	88.2	60.495	188.646	77.203	795
5.5	49.905	60.520	188.878	77.110	809
7.0	23.49	60.426	188.915	77.143	1010
8.5	4.815	60.520	188.935	77.140	1109
10	-4.59	60.525	188.943	77.155	1158

	X	Y	Z							
plate	588.8	193.823	0	6	1	-12.2	-13.5	-97	0	XY XR
48	0	0	-10.9	6	8	-4.8	-10.2	-13	-13	Yx"
96	0	0	-4.9	8	12	-5.4	-59	-9	-90	Yx"

Start Pit   -1   100 settle plate Pres.

Load Puttes 560

Identify   "   eV Barcode 1000
Seawell   " (Well)

AUTO FOCUS   - NEEDS DROP SIZE ADJ. ✱

+ - Did not skip all thumbnails missed two
    that were well centers than plugged
    next well into that wells spot.

  - Score not updating immediately in display
    go to next well then back

  - Color status not updating.
  - must click on plate to
  - Once a drop found, update/correct position
    not working
  - Op Caveat Error / Homing didn't Recover

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5/29/01 - Meeting
- QB tester - now working
- Clonetech Temp/Humid 12 wks form
- Review Robo - interface last week
- Marconi - talk today about RS/TM
        - review schematic tomorrow 10:30
- SGX - train operators
      - Vision development
      - X-ray presentation today w/ John?
        DB to install/Deliver Wed?
        Kurt   - charts of Deliverable

5/29/01 - SG   ⟨130.3 hr   4.65 GB⟩

- Database meeting w/ Kurtis, Howard, Michael
         protein range?   (9x) ?   ~~Gary~~
FREEZER 1 ml   A1   110 µl   Box
                                              → tray
Clone name   Matrix   Bar
prot. order ID   tubes   Code
rack #   Box 2
Alig ID   Box 5   Barcode
rack position   ID

LAB   1 Alig.

        110 µl → 96 x ul per well) Done w/
                                    Robbins Robot

Tray Type
    ↳ Tray Params   [Tray]
    ↳ Wells   ↳ prot. order ID
        ↳ Comment   ↳ temp
                               ↳ Bar code
                               ↳ Score well
                               ↳ Crystal

- X00 871
- X0000003 Scored
- X0000012
- Bar code printer ?

- Clear/not clear
- refine Auto focus
- Daniel class on Crystal

5/30/01 - Marconi

- Q: Find Block Diagram?
- Q: Received PLD sours ? y

* - review encoder inputs with Galil

* verify debug port is P6 on Robo schematic

- Documentation
  - Boin ok
  - Fault tree Yes
- John to email timing of Deliverables
- John also to check requirements for Fault Tree

* Solve RS command issues w/ Galil Defaults
   vs saved parameters

Get SW Release from David

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6/1/01

- Phase
- Wavelet ba.. would definitely give positive results for different ation
- Home in on objects or regions of interest
- bin region based on texture
- perform statistics on bins

* - brushlets .. trans Pause
* - local fom..

David Fiel..   Wavelets
Bruwell Ou.. ousen   Leaflets - C06
                             Charl walsh DOE ?
Neuro Scienc..

Edgelets
Curvelets
Ridgelets
* beamlets
Dave Donahoe Stanford

Victor Witort n..

Duane De erno - Neural Expert UCB

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6/1/01 - SGX

JANET'S CRYSTALS

- color to distinguish light precipitate

- 9 - more
    needle - 1D
    plate - 2D
    3D)

- graininess - distinguish? by sparkle

  quality order 3,2,1,4,5,0,6,7,8,9

- 1-2 early in the process
- 3   can happen late

- 7 different from 8 by shape beginning to be
                    discernable

- distinguish btw single & not

- difference btw 8 & 9 sometimes relative

- 1 nucleation vs many
SGX* set reference zoom when viewing
  ** auto scale jpg inc. on size
  ** Printers

SGX Remember whether images are loaded
  or live, don't goto, if not live

6/8/01 - Marconi - NOT DONE?!
- Couch Axis
- PMDC Single Speed Fails
  - Gene To get more info & ~~describe~~ define problem

6/11/01 - Weekly Meeting
- Identify Components for RoboArrayer Vision
- look @ Storage carosel for Clonetech
* Hardware/SW Selection to replace PVT
- forehealth coming Mon-Tues - Nextweek
* Quote Ph II image DB - SGX
- No Arrayer on floor from 6/21 - 7/21

SGX SW Tasks
- David to show where in SW data is saved/updated
- Well view kept ~~for~~ not ~~found~~ drops improved
- ~~Well~~ Drop size passed to Autofocus
- ~~Has~~ Zoom level set by drop size

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6/13/01 - SGX DB

Data Saved   labeled by ~~xxx~~ ~~DATA~~
  fr m Operator
Form Keyup event) key events

CPlate Display   ) save score
  OnWell Score   in memory

Manual
load!   - CPlate   ) write to file
         Save PlateData   ~~~~~~

         CImage Storage 7 handles saving Image
                              while running

         Scoring Form (keypresses) &
         Rightclick Lead1 (Main image)
         Click on Plate Image (1&6) bmpPlate() □□ ∩∩∩∩
         Click on ImageList LeadImgTot1

         SelectPlate 7 loading Data in for a plate

6/15/01 - SGX

6/28/01 - SGX - Calculations

AUTO FOCUS SLICES — TOTAL NEEDED?

Worst case:
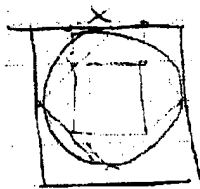 Assume 3 mm drop Diameter
  Assume $\frac{1}{2}$ sphere geometry

$r = \frac{3}{2} = 1.5$ mm

@ 10x zoom ≈ depth of field (measured) is 50µ
            or .050 mm

1.5 mm/.050 mm = 30 slices

SIZE X × SIZE Y

Y OK

6/29/01 - SGX Auto Focus Upgrade (136.2)

- 48 well circle highlight t small
- depth of drop seems bigger than thought
    - true geometry not $\frac{1}{2}$ sphere
- 2nd run not running a same plate
- w-axis erring out
- not saving status from previous auto-focus
- Plate types — different height ≈ 14-15 mm
- possibly calculate z from first 3-4 autofocus
    attempts
- small drop filter — fail find drop if too small

- Image comparison, filter by change
  At

- User name for scoring
- John wrote Tray setup (Driver to print barcode)

7/2/01 - Meeting

- Clonetech - Electronics ≈ July 15
- Light design for Clonetech - get w/ Jason
- Get camera up & running
- Added feature/default power-up on Marconi
- Quote Wilbur on 96 Head offset
- Call to find Techs - Mechanical, Electrical, Service
 ESI moving

_____

7/5/01 - Crystal strategies

- Test image set   Initial something/nothing
- Measurements
  - number objects   512 x 512
  - length width of objects   ROI
  - # of dimensions
  - gradient
  - grayscale
  -

  #

- ROI w/in Drop/minimal shading
- Grayscale calibration of each FOV ?
- Grayscale target
- Identify optimal contrast w/ gain, offset
- Use Hard Drive
- Tools Defined

- John Analysis approach/discovery   David - Supports
- Classification   Tools
- Mandel - Code Algorithms

drop ROIs   SGX   7/12/01
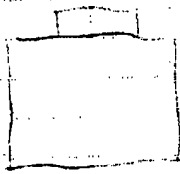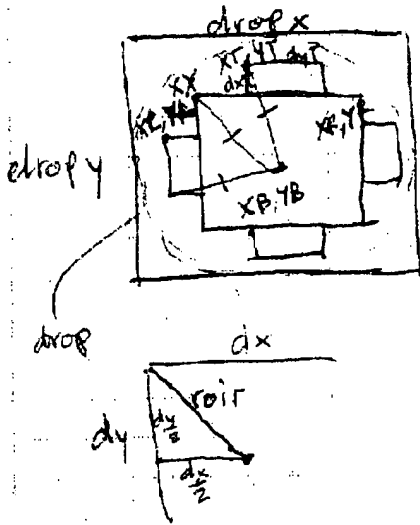
drop size = dropx × dropy

roi = dropx (roiPct) by dropy (roiPct)
roiPct ≈ .55 example

$dx = dropx (roiPct)$

$dy = dropy (roiPct)$

$(roir)^2 = \left(\frac{dx}{2}\right)^2 + \left(\frac{dy}{2}\right)^2$ } radius assumes circular

$roir = \sqrt{\left(\frac{dx}{2}\right)^2 + \left(\frac{dy}{2}\right)^2}$

$X_{TB} = X + \frac{dx}{4}$ $dx_{TB} = \frac{dx}{2}$

$Y_T = Y - \frac{dy}{4}$ $dy_{TB} = \frac{dy}{4}$

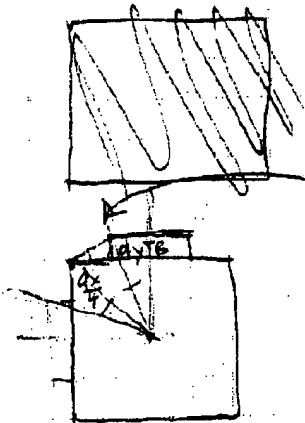$X_L = X - \frac{dx}{4}$ $dx_{LR} = \frac{dx}{4}$

$Y_{LR} = Y + \frac{dy}{4}$ $dy_{LR} = \frac{dy}{2}$

$X_R = X + dx$

$Y_R = Y + \frac{dy}{4}$

$X_B = X + \frac{dx}{4}$

$Y_B = Y + dy$

if assume ∠ is ½ of 45° then

$dy_{TB} = \frac{dx}{4}(\tan 22.5°) = \frac{dx}{4}(.4245)$
                     23°

or for circle

$\frac{dy}{4}(.4245)$

to approximate for oval

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7/13/01 SGX - RoboVision Testing

Run of an already run plate fails
   - stops immediately

B10
C4
D4   A5 - find drop forward center precip only
E10   A7 - "   "   "
E12   B7 - found ?
G4   C1 - "   "   "   "
G8   C7 - "   "   "
G12   E3 - "   "   "
            E4 - found ? edge
            E7 - "   "   "   "
            G9 - found ? edge

On miss find drops
   adjust min Dropsize ~~would~~
         was 600   to   15000
   Should have found A6, A11, B9?, E8?, G10, H5, H11
         change to 10000

Add 3.0 zoom setting
   3, 1, 3, 2.257, 0.215, .0022, 0, 114.075?, 570?, ...

7/16/01 - Weekly Meeting

SGX — Follow up with Curtis on quote & Tom DB ph II
     install software upgrade - autofocus & scoring!

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7/16/01 SGX - RV Testing

Problems:
- multiple plate scoring, not always saving data
- z offset not being applied

Approach
  windowed analysis
    gausian windowed
for entire image show response type by regions

initial classification approach in
    2-3 wks.
usually $299 for run-time dll

1

7/18/01 - SGX

- Operation Drop Error
- Op Drop
* - Force, Autofocus ?
- 48 well changed to dynamic zoom selection
- clear status
- score should not show/ color code
  for subsequent inspection

7/19/01 - SGX - review status & features

- focus looks good
- scoring status displayed from
  historical scores
- current tube, don't display when loading
  historical
- now have score viewer
- show scores check box, on local plate box
- Focus of mouse,
  replace, jog, correct, etc

X 459 - B5, C10

- User login

7/30/01 - SGX / Sunet

- how to present clean / not clear
- how to show last scores
- Sitting 96 D
- Auto focus on command / manual
- Replace feature set a way 2 working

- don't show virtual duplicate images
- don't show scores 2nd time

7/31/01 - Robo grayer

- camera on order
- SW interface to vote
- CE on camera / board ?
- Small pin inspection

3 August 2001

Oil filled tray with eosin st red lysozyme in columns

1-8. (Eosin/lysozyme mixed 1:1 with 8% NaCl in 100mM NaAcetate pH 4.5)

Drop sizes	Column
100 nl	1
150 nl	2
200 nl	3	→ Want to use this size if possible
250 nl	4
300 nl	5
350 nl	6
400 nl	7
500 nl	8

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8/6/01 - Weekly Meeting

- Clonetech here - Wed. Darryl will send Agenda
- Prelim. FTA to John-Marconi by Friday
- Ship RV 2 in office
  - software updates
  - support code for reports etc.
- Get add out for SW engineer
- Motorola here tomorrow Tues

8/9/01   RoboVision SW Debug

Look
IN
- Correct Op for glowrate error
- Move Next for loop error

8/13/a - Weekly Meeting

- Vision Debug w/ David - Clontech
- Ship RoboVision Tues
- Work w/ David to Recommend Barcode Solution
- ForeHealth in today @ 2:00
- SGX on Wed AM
- Investigate data recording on Temp/Humid, Chmbr
- Output / Program on Controller

BBQ   11:30 - 1:00 / Crown point   17

<u>3/20/01</u> - <u>Weekly Meeting</u>

- <u>Clonetech</u> - hit list / Andy keeping updated
- Need Rework head
- Build from David for 1st install
    - Mike to help
- Images of good spots from Darryl
- Bar code reader, recommend

- <u>SGX</u> - list issues / review w/ David & Kurt
- meeting @ SGX today 11:00 a
- fix install w/ Mike

- Oklahoma visiting at 10:00 a

- Marconi 9/20

- on Reset CSP signal / interrupt p
  chip select from Micro responds, then done

± 15 & ±5
   #

- Duart not functioning
- Clock out on 68331 18.384 exact?
       check w/ Galil

- 32.768 xtal for quick power up

- modelk pulled high
   - changed to pulled low at reset
   Xtal p/n → Epson MC405 32.768 KHz Surface Mnt
            Citizen CM20r
               E5023A

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8/21/01
SW Testing SGX RoboVision

- Trying to find scenario when scores not
  saved
- Abor - on 1st inspection after start of app
  if zoom reg. is 3, it does not go
  there, stays @ 10 or home location
X - Correct & replace, then subsequent run
  stops on that well
  - drop x & y too big

8/22/01 SW - Testing SGX

◯ Load plates not always clearing plate status
X - Didn't save plate data?
X - Zoom control not working on Live
X - manual correct, stores pixels & 25 zoom
  & 2 = -5 ?
X - Load plates dialog not clearing, image is not
  live - redraw issue only if image in display
? Skipping first plate - ran 1st time through
  On Well Start: failed to any well records for plate
  Get Next Seq Op - Stop plate
  Seq: Start Plate
       Set Zoom
       Stop Plate
? - Al find Drop took forever, did not find
? - Cannot select plate screen after run
  - same problem - plate record not saved
✓ - Drop pos 2 shows same as x after correct

- 48 well FindDrop
- Display scores on autoload
- Test correct & replace
- Replace image not working in thumbnail view

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8/24/01 SGX   SW upgrade v. 1.6
SN 31   (150.0 HRS)
drop image status being written as -1
plate status "started

8/27/01 - ~~dev~~ Weekly Meeting
sex
- Talk to James about coming up for sign off
- Fix install
- Meet w/ Database guys demonstrate

8/27/01 SGX RoboVision stall debug

I/O driver 1.3.0 05/10/01
Motor   2.3.1 02/19/01

@ SGX   SN 32 - 3   4 G Free 1168.8 HRS
                   SN 31 = 3   6 G Free 150.5 HRS
- complete un-install, & Clean
- Re-install, still not working
- Data problems persist
- Installed mdac 2.6
- All started to work...
- Thumbnail updates, star for next run doesn't work
SN 31 - change 2nd Nic to NETBUIS only

8/28/01 - RoboArrayer Inspections
- Average offset for each image represents ave
  pin position.
- normalization of 0,0 pin position for a head
  of matched pin sets,
- measure pin to pin variations w/in same image
- All pin position measure
- Check distortion as lens

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8/28/01 - SGX Meeting w/ DB

- interested in moving images as a part club
  into their DB
- scored before find drop on half the
  plate, find drop run on those wells @ 3x
- Max score not being updated in plate
  record
- 2nd machine, transfer of serial Barcode
  over wires
- Auto focus & sample on/off

8/29/01 - Buyoff, Clontech

- Main Array Burst & Test   next week
- Rework Testing   next week
- Barcode complete   2 next week
- Report write out   2 next week
- Rework Time estimation/algorithm next week
- Inspection Function   This/next week
- Robot Interface
- Alarms
- Release

9/4/01   Weekly Meeting

- Help Aaron w/ Calibration plate/SGN/M

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9/24/01   SRNM - Andreas called

failed
use pin
192.1.3.0.202
to identify Hbw or SW

to open digital interface —

9/28/01   SGX   SW upgrade V. 17

SN 32   218.0 hrs   31.1 G Free

SN 31   162.2   hrs   35.2 G   "

1 - 3 = 14   + (1.77)
2 - 4 = 1   (1.63)
3   - 32

String   op array det

-3   z   set
-7.06 x   set
-3.99 y   set

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10/18/01 - SGX

- Auto Focus not working well on clear chops
- Goto live from thumbnail not matching
- Score erased when replace image
- Light watchdog?
? * - User ID - log off Auto?
? * - List of Field names

10/22/01   Weekly Meeting

- SGX meeting This morning
- Clear/not Clear SGX this Friday?
- Accel & Vel for X-Axis
- Tuning updates on all other Machines

- Kurtosis analysis / Statistic?
  [SGX]
A - Link login # to their DB
    they can add to our mdb.

- Auto focus improvements
- Second inspection offset